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Coupled Air Sea Processes and EM Ducting Research (CASPER)

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The CASPER project aims to better quantify atmospheric effects on the propagation of radar and communication signals in the marine environment. Such effects are associated with vertical gradients of temperature and water vapor in the marine atmospheric surface layer (MASL) and in the capping inversion of the marine atmospheric boundary layer (MABL), as well as the horizontal variations of these vertical gradients. CASPER field measurements emphasized simultaneous characterization of electromagnetic wave (EM) propagation, the propagation environment, and the physical processes that gave rise to the measured refractivity conditions. CASPER modeling efforts utilized state-of-the-art Large Eddy Simulations (LES) with a dynamically coupled MASL and phase-resolved ocean surface waves. CASPER-East was the first of two planned field campaigns, conducted in October/November 2015 offshore of Duck, North Carolina. This article (NPS users only) highlights the scientific motivations and objectives of CASPER and provides an overview of the CASPER-East field campaign. The CASPER-East sampling strategy enabled us to obtain EM propagation loss as well as concurrent environmental refractive conditions along the propagation path. This article highlights the initial results of this sampling strategy showing the range-dependent propagation loss, the atmospheric and upper oceanic variability along the propagation range, and the MASL thermodynamic profiles measured during CASPER-East.

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